

AU/ACSC/0161A/97-03

AIR OCCUPATION
AN ENVIRONMENTAL IMPACT STUDY

A Research Paper
Presented To
The Research Department
Air Command and Staff College

In Partial Fulfillment of the Graduation Requirements of ACSC

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March 1997

Report Documentation Page

Report Date 01MAR1997	Report Type N/A	Dates Covered (from... to) -
Title and Subtitle Air Occupation An Environmental Impact Study		Contract Number
		Grant Number
		Program Element Number
Author(s) Tallent, Michael E.		Project Number
		Task Number
		Work Unit Number
Performing Organization Name(s) and Address(es) Air Command and Staff College Maxwell AFB, Al 36112		Performing Organization Report Number
Sponsoring/Monitoring Agency Name(s) and Address(es)		Sponsor/Monitor's Acronym(s)
		Sponsor/Monitor's Report Number(s)
Distribution/Availability Statement Approved for public release, distribution unlimited		
Supplementary Notes		
Abstract		
Subject Terms		
Report Classification unclassified		Classification of this page unclassified
Classification of Abstract unclassified		Limitation of Abstract UU
Number of Pages 55		

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Preface

Air Occupation is a controversial topic. Today, the US, under economic pressures, finds itself attempting to leverage its technological advantage to achieve political and military objectives. Increased intelligence capabilities (satellites coupled with near real-time communication), increased precision (precision-guided munitions), stealth aircraft (capable of penetrating enemy defenses and applying airpower when and wherever required with minimal risk), and the command and control architecture have combined to give the US an asymmetric airpower advantage. The US demonstrated the asymmetric application of airpower during Desert Storm in the skies over Iraq and is currently employing Air Occupation theory in Iraq and Bosnia.

Airpower theorists have enthusiastically endorsed Air Occupation theory as a reality. However, is Air Occupation theory universally applicable? Its use in each situation is unique and must be evaluated to determine the effectiveness of airpower. Airpower provides a cheaper way to occupy a country or territory in order to achieve our political objectives and eventual end state. However, our desire to enthusiastically endorse airpower's success during Desert Storm has clouded our judgment about current limitations of airpower. This research paper analyzes the impact of the environment on the overall mission success of airpower during Air Occupation missions, and presents recommendations for improvement.

Abstract

The purpose of this study is to examine a new concept of operations for the US Air Force—Air Occupation—using airpower exclusively to provide security, presence, and coercion in pursuit of operational and strategic objectives. This study will examine the validity of Air Occupation Theory through analysis of historical uses and current applicability in different environments. Moreover, this study will determine if there is a significant measurable difference in successful application of Air Occupation theory between the Iraq and Bosnia theaters of operations. Pilots' performance flying Air Occupation missions in Iraq will be compared to pilots' performance flying similar missions in Bosnia. Finally, the study will conclude with recommendations for improvement in current accepted tenets of airpower.

The end of the Cold War has unleashed nationalistic, religious, and border disputes upon the emerging world order. The US, under pressure to downsize its military and realize the peace dividend for winning the Cold War, is attempting to apply the policy of selective engagement. However, emerging world order turbulence requires the US to continually promote world stability, prosperity, and democracy. The US is willing to accept this burden, evidenced by operations in the Gulf War and Bosnia, but decreasing defense forces and budgets are beginning to strain current doctrine. Airpower's dramatic use of technology during the Gulf War, coupled with declining resources, is pushing Air Occupation as the preferred future concept of operations.

The RAF used a similar application of airpower, termed Air Control, in the 1920s and 1930s in Southwest Asia/Mesopotamia. No-fly zones in northern Iraq, southern Iraq, and Bosnia all currently employ the operational concept of Air Occupation.

Air Occupation is a valid operational concept of operations that optimizes limited resources and the US's technological advantage to achieve operational and strategic objectives. The US current airpower technological advantage combines the principles of precision, limited collateral damage, accurate intelligence, limited risk penetration capability, and an extremely capable command and control infrastructure. However, the environment in which pilots are flying Air Occupation missions has a significant measurable impact on the success of Air Occupation missions.

The methodology for this research project is the comparison of mission performance between Iraq and Bosnia during Air Occupation missions. A random survey instrument will be used to analyze pilot performance during Air Occupation missions in Iraq and Bosnia. The two test scores will be analyzed using inferential statistics, a T test for matched samples. If there is a statistical significant difference in the performance scores between the groups, the hypothesis will be supported.

My conclusion is that the environment has a significant measurable impact on the success of Air Occupation missions.

Chapter 1

Introduction

The world watched in awe as Coalition airpower surgically dismantled the mighty Iraqi war machine. Coalition airpower decimated the fifth largest army in the world and was truly decisive in Desert Storm. The US Air Force's fifteen-year investment in high technology and realistic training was paying off and CNN was showing the devastating effects "*live*" to the world.

Airpower advocates came up short in WWII, Korea, and Vietnam, but Operation Desert Storm provided the medium to showcase airpower's capabilities and finally validated airpower theorists' concepts. Seventy years of over promising evaporated in a few weeks as airpower took center stage. Overzealous airpower advocates quickly espoused inflated lessons learned following the Persian Gulf War and risked the embarrassment of over promising once again. The Persian Gulf War successes have clouded our judgment as to the current limitations of airpower. Each environment is unique and must be evaluated to determine the effectiveness of airpower.

After the Persian Gulf War, peacekeeping, peace enforcement, nation building, and humanitarian efforts significantly increased and led to numerous occupation missions in support of these Military Operations Other Than War (MOOTW) missions. Traditionally, ground combat troops are deployed to provide a presence, maintain

security, assist in humanitarian efforts, and provide stability until other international, governmental, or host nation agencies can resume control.¹ Current operations in Iraq and Bosnia are examples of MOOTW-type occupations. However, use of ground forces in this role is costly, logistics intensive, and US ground forces are exposed to numerous threats in an environment where political restrictions can severely restrict Rules of Engagement (ROE) and constrain a military response. No one questions whether the Army is uniquely trained and equipped to conduct post-conflict occupation missions. The question is whether the US can afford the enormous cost in treasure and potential blood to conduct these missions. Decreasing resources and airpower's significant success in the Persian Gulf War combined with the US inability to tolerate casualties and stimulated new thoughts on how to conduct MOOTW-occupation missions. Air Occupation was presented as a viable alternative to ground forces in MOOTW-occupation missions because of its cost, effectiveness, reduced risk, quick response, and ability to cover vast areas of land. Colonel Warden USAF, the Chief Pentagon planner during Operation Desert Storm, facilitated debate on this issue when he wrote:

The viability of Air Occupation: Countries conform to the will of their enemies when the penalty for not conforming exceeds the cost of conforming. Costs can be imposed on a state by paralyzing or destroying its strategic and operational base or by actual occupation of enemy territory. In the past, occupation (in the rare cases when it was needed or possible) was accomplished by ground forces—because there was no good substitute. Today, the concept of Air Occupation is a reality and in many cases it will suffice. The Iraqis conformed as much or more with UN demands as the French did with German demands when occupied by millions of Germans.²

Obviously, Colonel Warden believes the success of airpower in Iraq can be repeated and enable airpower to replace ground forces in many MOOTW-occupation missions. The

question is whether airpower is equally effective in Air Occupation missions in all physical environments.

Strategic Environment

Today, the US is the only military superpower and has been called upon to be the world's policeman. President Bush's success against Iraq, combined with the US role as the only military superpower, and the resurgence of the UN has resulted in the world community calling the US when it is time to "dial 911." The problem confronting the US military is that US military commitments are increasing while the US force structure is declining. Two trends are colliding and one of them must give way.

Increased MOOTW occupation type operations combined with decreasing US military resources demands the exploration of alternative methods of conducting MOOTW occupation missions. The solution to the problem lies in taking advantage of a US strength—airpower. Airpower's decisive impact during the Gulf War demonstrated its capability to significantly affect the outcome of wars. Colonel Warden argues the strength of airpower in his article "The Enemy as a System" when he elaborates on the ability of airpower to accomplish an occupation mission:

The loss of air superiority put Iraq completely under the power of the Coalition; what would be destroyed and what would survive was up to the Coalition and Iraq could do nothing. It lay as defenseless as if occupied by a million men. For practical purposes, it had become a state occupied—from the air.³

The debate began on whether airpower could actually accomplish an occupation mission without ground forces. Airpower enthusiasts cited remarkable results achieved in the Gulf War. Airpower provided security, presence, and coercion, all required elements for

Air Occupation. Moreover, Operation Southern Watch (OSW), Operation Provide Comfort (OPC), and Operation Deny Flight (ODF) are current examples of ongoing Air Occupation missions. These operations, enforcing UN-sponsored no-fly zones, have protected innocent civilians and coerced the Iraqi and Serbian governments to meet UN demands. Finally, airpower advocates argue that airpower is currently accomplishing these occupation missions without risking US servicemen's lives on the ground and at significantly reduced cost.

On the other hand, supporters of the traditional Army role in post war occupation missions doubt Air Occupation's effectiveness. They argue territory cannot be occupied unless a soldier is standing on it. Moreover, they argue that while airpower was decisive in the Persian Gulf War, it was the Army who eventually ejected the Iraqi ground forces out of Kuwait and occupied the land. In other words, airpower cannot conduct effective occupation missions without ground forces. This is a valid point, but the US cannot afford traditional methods due to the enormous cost and current reduction in force structure. Alternative methods that are less expensive and exploit US advantages must be explored.

Given today's geo-political environment in which US resources and defense forces are shrinking combined with an exponential increase in US MOOTW occupation type missions; one would argue that Air Occupation is a mission whose time has come. Air Occupation offers the US the capability to leverage its technological advantage and provide presence, security, and coercion during an occupation mission for less cost and reduced risk. Obviously, Air Occupation offers the US the solution to today's geo-political realities.

While most of the debate has centered on whether airpower can accomplish an MOOTW-type occupation mission without ground forces, there are a few individuals who have questioned whether the success of airpower in the Persian Gulf War is universally applicable. In other words, does the environment in which airpower is applied significantly affect the success of airpower? Military analyst David Hackworth emphasizes there are three governing factors in war that must be considered: the nature of the enemy, the terrain, and the weather.⁴ All three will be examined extensively in the Air Occupation survey. Airpower enthusiasts have cited recent success in the Persian Gulf and technology as key factors placing airpower as the preeminent instrument for power projection. On the other side, some have argued that the Persian Gulf War was conducted in a unique environment that is conducive to the successful application of airpower. These observers assert war planners must carefully consider the environment when attempting to predict the success of airpower. In short, airpower's recent success in Iraq cannot be universally applied in every environment. Dr. Kenneth P. Werrell, a military historian, argues this point when he states:

Those distilling the lessons of this conflict should bear in mind its uniqueness, because like all historical events, future circumstances will never be exactly the same. This was a conventional war more akin to WWII than to Vietnam, clearly not a guerrilla war or low-intensity conflict. The US has proven it can win the former; the later is in doubt. Our next opponent may not play to our strength. The terrain favored the use of airpower. Jungles, mountains, or highly populated areas would not be as easy for air operations as the desert.⁵

Obviously, the environment has an impact on the application of airpower. Airpower enthusiasts have been quick to rally behind the recent success of airpower in Iraq; however, over-zealous advocates have been too quick in their proclamation that airpower

will be the decisive instrument of war in all future conflicts. The impact of the environment (terrain, weather, nature of the enemy, and ROE) on the success of airpower needs to be studied further and the Air Occupation survey used in this report will provide us with the answers.

Air Occupation—The Concept

Air Occupation is an efficient method (less cost and risk) of applying military power over a large area to seize, deny, and control territory in order to coerce an enemy to do our will. Air Occupation gives the military planner the flexibility to use fewer resources and still achieve the desired strategic and operational objectives. Colonel Warden agrees when he states that Air Occupation is a valuable concept the military planner can use to leverage the asymmetric advantage of airpower to induce a political settlement or impose restrictions on a state at a much reduced cost.⁶ Under the present landscape, Air Occupation offers an alternative to ground combat forces that can achieve political and strategic objectives at a significantly reduced cost and risk.

Air Occupation combines four distinct technological innovations: advanced aerospace technology, precision weapons, real-time intelligence, and a sophisticated command and control architecture.⁷ Advanced aerospace technology can dominate, control, and occupy the air dimension over a desired strategic area through control of information. Surveillance and monitoring technology consisting of space-borne (satellites), and fixed-wing aviation assets (AWACS, Rivet Joint, JSTARS, ABCCC, U-2) conduct continuous monitoring, detection, surveillance, and collection of signal, electronic, communication, and imagery information. These systems are the eyes and

ears that operate in the air dimension and allow direct action technology to strike the correct target at the correct time.⁸

The environment significantly affects the ability of space-borne and fixed-wing intelligence platforms to collect vital information necessary for efficient Air Occupation missions. Adverse weather (clouds, fog, haze, dust) limits intelligence platforms ability to collect critical imagery intelligence. More importantly, fixed-wing aviation assets rely on line of sight to obtain their critical signal, communication, and emission intelligence. In other words, fixed-wing aviation intelligence platforms obtain more data when operating over flat open terrain as opposed to mountainous rugged terrain. AWACS, Rivet Joint, and JSTARS are outstanding platforms to obtain real-time intelligence, but they work significantly better in open terrain because they cannot see through mountains.⁹ The Air Occupation survey will compare the impact of weather and terrain on intelligence collection and Air Occupation operations conducted in Iraq and Bosnia.

Direct action technology includes multi-service fixed and rotary-wing aviation platforms and unmanned missile technology (Tomahawk, MLRS, ATACMS). The threat of using direct action technology to strike surface targets, or their actual use can achieve strategic and operational objectives. More importantly, precision-guided munitions (PGM) allow surface targets to be destroyed with such accuracy that planners can attack targets located close to good actors (non combatants) and be confident that direct action weapons can discriminate between good and bad actors and limit collateral damage.¹⁰ PGMs have truly revolutionized air warfare and magnified the effects of airpower. The devastating effects of precision-guided munitions (PGMs) were a major factor in the success of the Persian Gulf War and are a key factor in the concept of Air Occupation.

Laser-guided PGMs require clear visibility in order for the munitions to guide accurately. In other words, environmental factors that reduce visibility over a potential target will decrease the precision of PGMs and hinder the ability of the direct action platform to employ PGMs. Fog, low clouds, dust, and severe smoke/haze cause laser target designators to disperse and degrade. The end result is the PGM guiding on a degraded signal, which is not as precise, and results in the PGM not guiding accurately. Television-guided PGMs also require clear visibility in order for the munitions to pick up the target and guide accurately with assistance from the direct action platform. The bottom line is, environmental factors that reduce visibility in the target area significantly affect the ability of direct action platforms to employ PGMs and the overall precision of PGMs. The Air Occupation survey will examine the impact of weather on the employment of PGMs.

Real-time intelligence uses national space-based assets and fixed-wing assets to collect information, process that information, and transmit vital intelligence to operators who can use that information. Joint Vision 2010 identifies the requirement for systems to “locate the objective or target”¹¹ and that is exactly what our national and fixed-wing assets attempt to do. The desire is to reduce the amount of time it takes for our intelligence platforms to locate the target and transmit that information to a direct action platform who can engage and destroy the target with PGMs. The ability to accomplish that task in near real-time is the definition of real-time intelligence. PGMs are of no use unless the direct action platform attacks the correct target. As weapons become more precise, and the desire to limit collateral damage more important, intelligence requirements become far more critical. During WWII, bombers would “carpet bomb”

certain areas of entire cities hoping to hit a factory or series of factories. Today, F-117 stealth fighters are dropping one 2,000 bomb through a ventilation shaft (3' x 3') on a bunker with a time delayed fuse that will detonate when the bomb reaches the fifth floor.¹² Obviously, the intelligence requirements for today's mission are significantly higher than during WWII. Moreover, pilots require more real-time intelligence updates in order to correctly locate mobile targets. Air Occupation relies on accurate intelligence with near real-time updates to ensure successful mission accomplishment. The Air Occupation survey examines how well we are currently meeting intelligence requirements.

The final technological innovation required in order to effectively accomplish Air Occupation is a sophisticated command and control architecture. Communications and information systems currently synchronize aerospace systems operating within the air dimension. AWACS and JSTARS communicate and coordinate near real-time information from leaders to direct action operators.¹³ These command and control systems allow leaders to commit their direct action technology systems where and when required, with the help of real-time intelligence, to achieve the greatest impact. Adverse weather and mountainous terrain degrade command and control effectiveness by reducing their line of sight and ability to obtain critical intelligence. Simply put, adverse environments inhibit intelligence collection and communication. Once again, the Air Occupation survey will examine how well we are currently meeting command and control requirements.

Technology has caught up with operational doctrine and combined to make airpower a decisive force on the battlefield and Air Occupation a valid concept in 1997. The operational concept of Air Occupation exploits and leverages the asymmetrical advan-

tages of aerospace technology to achieve a significant position of advantage. It is from this position of advantage that airpower can provide security, presence, and coercion (over a specific region) and achieve operational and strategic objectives.

Problem Statement and Method

Debate has centered on the lessons learned from the success of airpower in the Persian Gulf War, and in recent operations enforcing UN-sponsored no-fly zones in Iraq and Bosnia. Moreover, the debate between airpower and ground combat forces as the preferred method of accomplishing MOOTW-type occupation missions has taken center stage as Air Occupation gains acceptance. The purpose of this study is to determine and quantify if there is a significant measurable difference in the mission success of Air Occupation missions between the Iraq and Bosnia theaters of operations. More importantly, this study will determine and quantify if environmental factors (terrain, weather, nature of the enemy, and ROE) significantly affected Air Occupation mission success. Pilots' overall mission performance flying Air Occupation missions in Iraq will be recorded and compared to pilots' overall mission performance flying similar Air Occupation missions in Bosnia.

Statement of Hypothesis

The environment has a significant measurable impact on the mission success of Air Occupation missions.

Notes

¹ Department of the Army FM100-5, Operations, June 1993, 3-12.

Notes

² John A Warden III, “Air Theory for the Twenty-first Century,” Challenge and Response (Maxwell AFB, AL; Air University press, August 1994), 329.

³ Maj George Kramlinger USAF et. al., CONOPS 2010 Air Occupation, ACSC Papers (Maxwell AFB AL: Air University Press, May 1995), 4.

⁴ David Hackworth, “Air Power Just Won’t Work,” Aviation & Space Technology, v121 n20 (May 17, 1993): 32.

⁵ Dr. Kenneth P. Werrell, “Air War Victorious: The Gulf War vs. Vietnam,” Parameters, v22 n2 (Summer 1992): 51-52.

⁶ John A. Warden, Col USAF. ACSC Air Occupation Video.

⁷ Ibid.

⁸ Ibid.

⁹ “Joint Surveillance Target Attack Radar System,” Jane’s Defense Weekly, v25 n03 (January 17, 1996): 26.

¹⁰ Ibid.

¹¹ John M. Shalikashvili, *Joint Vision 2010*, 14.

¹² Richard P. Hallion, *Storm Over Iraq*, (Washington DC: Smithsonian Institution Press, 1992), 303.

¹³ Richard P. Hallion, *Storm Over Iraq*, (Washington DC: Smithsonian Institution Press, 1992), 309-310.

Chapter 2

Background

The British Air Control Experience in the Middle East

The strategic situation in Britain between WWI and WWII is similar to the current situation facing the US. Both the RAF and US exploited the permissive Iraqi environment (weather, terrain, and visibility) through the employment of airpower to achieve their operational objectives. Close examination of RAF and US operations in Iraq reveals many similarities. The RAF “Air Control” experience serves as an excellent case study since the RAF exploited the Iraqi environment in much the same way as the US during post Persian Gulf War operations. I intend to prove Iraqi environmental factors were keys to success for RAF and current Air Occupation operations.

The British RAF employed airpower to maintain order (peacetime administration) in the British colonies located in the Middle East as a cost-effective alternative to large conventional ground forces.¹ The British used airpower to conduct imperial policing of their colonies and termed the policy “Air Control.”² The concept of Air Control was used in Mesopotamia (Iraq) during the 1920s and 1930s and evolved into a doctrine with four principles: asymmetric advantage of airpower, requirement for accurate intelligence, use of limited force, and desire to limit collateral damage.

Airpower provided the British an asymmetric advantage because the aircraft of the time exploited the Iraqi flat terrain, good weather, and clear visibility. Additionally, RAF aircraft were ideally suited for Air Control and provided penetration capability, relative speed, and invulnerability from attack. The RAF used airpower to coerce the tribes to conform to British desires and was reluctant to use direct action (deadly force). The preferred method was to disrupt the normal lives of the tribe populations by targeting tribe resources and not people. Indiscriminate destruction and killing was not the objective and attempts to minimize these effects were significant. In short, the RAF possessed aircraft that could penetrate the skies over Mesopotamia with little risk, achieve relatively precise bombing accuracy, and minimize civilian casualties.³ Finally, the flat, barren terrain was conducive to the use of airpower and offered little protection to the tribe populations which elected to submit to the British desires rather than fight and have their lives disrupted. The Air Occupation survey will examine the impact of terrain on airpower effectiveness.

Like current OPC and OSW, RAF Air Control relied heavily on accurate intelligence. Air Control operations in Mesopotamia were joint operations involving airpower and small armored car squadrons. The armor car squadrons defended the air bases in Mesopotamia, conducted limited joint operations with RAF air support, provided a British colonial presence among the nomads, and (most importantly) were an important source of intelligence. An additional source of intelligence was the colonial administrators who lived with the local population of Mesopotamia.⁴ The colonial administrators provided critical human intelligence (HUMINT) that could detect warning signs of impending trouble, predict tribal intent, and identify the source of trouble which

could be engaged without harming the innocent.⁵ The colonial administrators were critical to the “Air Control” concept since they provided the intelligence which enabled airpower to engage the belligerents and not the innocent. The RAF “Air Control” concept of using ground forces in conjunction with airpower more closely resembles current operations in Bosnia vice Iraq.

Today, sophisticated satellites provide leaders with critical intelligence, but understanding the intent of people (like the colonial administrators did) is difficult even with the most sophisticated satellites. The problem is finding a balance between human intelligence and intelligence gathered from recent technological innovations (SIGINT, ELINT, COMINT). Human intelligence has certain advantages (intent), but has certain drawbacks (safety), while technology allows the collection of increasing amounts of information with limited or no risk. Moreover, human intelligence can penetrate the most rugged terrain and infiltrate small guerrilla organizations while today’s sophisticated intelligence platforms are designed to locate modern conventional armies and are limited by mountainous terrain and poor weather. Today’s leader must choose the balance that meets his requirements. The RAF relied on human intelligence to meet their requirements and combined with airpower to make “Air Control” extremely successful.

The British RAF used the concept of limited force and the desire to limit collateral damage in Mesopotamia during Air Control missions. The British RAF always used the minimum force necessary in order to maintain the support of the innocent while punishing the dissident faction.⁶ The local population was cohesive and excessive force could alienate even the friendly populace.⁷ Hence, Air Control worked most effectively when limited force was used ensuring the lawful factions of the population felt supported

rather than dominated by the British RAF.⁸ When direct action was taken, Air Control targeted resources, not people and the relative accuracy of aerial bombing resulted in few civilian casualties.⁹ Current Air Occupation theory, similar to the RAF “Air Control” concept, attempts to limit collateral damage and minimize unfavorable world opinion through the use of PGMs. The RAF used direct action as a last resort, relative accuracy minimized collateral damage, resources were targeted instead of people, clear weather allowed the RAF to visually acquire and engage their targets, and the overall result was that airpower coerced the populace to submit to the will of the British colonial government.

Despite all the capabilities the concept of “Air Control” demonstrated in Mesopotamia, the British RAF understood the limitations inherent in the concept. First, the British RAF realized “Air Control” is a viable concept when a state wants only to control a region and impose their political will. States that desire to conquer a region must rely on more than just airpower to occupy it. More importantly, the RAF concluded Air Control was not appropriate for all environments, specifically urban environments and against a relatively sophisticated adversary.¹⁰ Both the environment and desired end state are limitations of the “Air Control” concept. The effect of the environment (terrain, weather, and ROE) will be examined in the Air Occupation survey.

The British RAF used “Air Control” to efficiently control Mesopotamia in the 1920s and 1930s and achieved their operational and strategic objectives when ground forces could not. The RAF skillfully exploited the permissive Iraqi environment and achieved operational objectives. Moreover, the RAF combined the asymmetric advantage of airpower, relative precision bombing, accurate intelligence, use of limited force, and

desire to limit collateral damage to create a cost effective alternative to ground forces in the occupation role. Closer analysis shows many similarities between the principles of Air Control and Air Occupation. Technology has changed the names of the systems and platforms involved, but the basic concept remains the same.

US Air Occupation Operations in Iraq

Today the US finds itself applying asymmetric power in the form of airpower to achieve a position of advantage and coerce Iraq to comply with United Nations resolutions. Joint airpower operations conducted continuously over portions of Iraq reflect joint campaign planning and validate the use of Air Occupation as an operational concept. While Iraqi civilians lead their day-to-day lives, airpower monitors the no-fly zones in Iraq and provides a presence that can be selectively used when required. Sophisticated technology has merged with operational doctrine, enabling airpower to conduct Air Occupation missions over Iraq and coerce/pressure the Iraqi government to comply with UN resolutions. Airpower's recent success during the Persian Gulf War and currently enforcing the no-fly zones over Iraq has resulted in zealous support for airpower. However, before airpower success can be universally applied, the environmental factors which can mean the difference between success and failure must be examined on a individual case by case basis to determine airpower compatibility.

The Iraqi environment (terrain, weather, nature of the enemy, and ROE) is conducive to the employment of airpower. The terrain is primarily a flat, barren open desert with little to no concealment available to protect ground forces from the air and screen them from sophisticated intelligence collection platforms. Moreover, the weather is generally

clear with good visibility allowing airpower to easily acquire surface targets and engage with PGMs. The Iraqi military is a large conventional force with a sophisticated infrastructure (easily detected by US intelligence platforms) that is not located in close proximity to the general population. US intelligence platforms were designed to locate and track the large Soviet conventional threat (the Iraqi army is modeled after the Soviet army). In other words, the Iraqi military presents airpower a target that is easily acquired (due to the favorable weather, terrain, and visibility) and easily engaged (due to its conventional nature and large infrastructure). Moreover, Iraq is a relatively large country with the military and civilian population separated by large distances that permits airpower to engage military targets with limited concern for collateral damage. In addition, good visibility allows PGMs to be employed in congested areas, significantly increasing precision and reducing the possibility of collateral damage. Finally, the ROE used in Iraq works quite well in the permissive environment. Good weather and clear visibility allow direct action platforms to acquire surface targets visually and employ PGMs without significant risk of collateral damage.

The Iraqi environment (open and flat) and nature of the enemy (large conventional army) has made Iraq susceptible to US intelligence collection platforms. Moreover, near real-time intelligence leverages airpower's capabilities to produce remarkable results and efficient Air Occupation operations. An example illustrating Iraq's permissive environment happened in October 1994, when Iraq conducted massive ground deployments into southern Iraq, threatening Kuwait. US intelligence platforms easily detected the large conventional threat due to the flat open Iraqi terrain (increased line-of-sight), and good weather. The Iraqi government was directed by the UN to stop these threatening ground

troop movements. When Iraq continued their defiance of the UN, the Coalition countered by instituting operation Vigilant Warrior and deployed Coalition airpower back into the Kuwaiti theater.¹¹ The resolve of the Coalition plus the threat of direct action by Coalition airpower convinced Iraq to remove their ground forces from their threatening positions. Airpower's presence coerced the Iraqi government to conform to UN demands without the actual use of direct action. In short, US intelligence platforms identified and located the threat and Air Occupation achieved operational objectives.

Iraq's response to Air Occupation indicates selective compliance with the UN resolutions and direct action has been required to achieve compliance on several occasions. Direct action was required in 1993 when two F-16's and two F-15E's attacked a SA-3 SAM with four laser-guided bombs (PGMs) and cluster bombs after the SA-3 site launched two missiles at the Coalition aircraft.¹² Coalition aircraft have engaged and destroyed Iraqi aircraft, radar sites threatening Coalition aircraft, and facilities suspected of producing weapons of mass destruction. The 18 April 1993 attack by over 75 aircraft on select targets within the no-fly zone speaks to the power of Air Occupation. Another example of direct action occurred on 16 January 1993. In response to Iraqi defiance of UN resolutions and refusing to allow UN inspectors into Iraq unless the southern no-fly-zone was suspended, the Coalition struck the Zaafaraniyah nuclear weapons facility located just outside Baghdad.¹³ Coalition airpower, due to the favorable Iraqi environment, is able to monitor the entire region, apply direct action when required to ensure compliance, and exploit the air dimension over Iraq. The end result was reluctant Iraqi compliance with UN resolutions.

Open terrain and good weather enable airpower to monitor Iraq. The separation between civilians and the military reduces the risk of collateral damage when direct action is required. Obviously, the Iraqi environment is conducive to airpower. The Air Occupation survey will examine this premise and provide quantifiable data to support or disprove it. Perhaps the reason the British RAF and the Coalition have employed airpower successfully over Iraq has more to do with the Iraqi environment than with airpower's inherent capabilities.

Technology and Air Occupation have combined to achieve operational and strategic objectives in Iraq at a significant reduced cost and risk. The success of Air Occupation has not been without confrontation, but airpower's ability to use direct action has coerced Iraqi compliance. General Fogleman agrees when he states:

Our post-Desert Storm activities in Southwest Asia are another example of employing an asymmetric force to achieve US security objectives. Through the use of airpower, we have enforced UN sanctions against Iraq and compelled Hussein to accept the most intrusive UN inspection regime that a state has ever had to endure. For more than four years, we and our allies have leveraged our advantage in airpower—both carrier and land based—in Southwest Asia to achieve political objectives without placing large numbers of young Americans in harm's way. This has truly been an Air Occupation of Iraq.¹⁴

Today, the Coalition has created what the British RAF accomplished 70 years earlier. Air Occupation is a concept that exploits the Iraqi environment significantly in favor of the Coalition.

United Nations Air Control Operations in Bosnia

The success of airpower in the Persian Gulf War and the current successful employment of airpower in the Air Occupation role over Iraq significantly affected US

leaders' decision making. Given the present geo-political environment, airpower offers the political leader the best of both worlds (limited risk and reduced cost). However, Bosnia's hundreds of years of ethnic and religious confrontation, rugged terrain, poor weather, and the guerrilla nature of the conflict posed a far different environment to test airpower's capabilities.

Despite the obvious differences in the environment between Iraq and Bosnia, military and political leaders attempted to apply airpower's success during the Persian Gulf War to the Bosnian situation. General McPeak, USAF Chief of Staff, advised the political leadership that airpower would bring a lopsided superiority in every aspect, similar to Desert Storm.¹⁵ Moreover, General McPeak testified that the US Air Force could destroy most Serbian artillery in Bosnia at "virtually no risk" to US pilots.¹⁶ This inflated rhetoric, which did not consider the limitations of airpower, risked the embarrassment of over promising once again. In the end, President Clinton selected airpower because air advocates espoused inflated capabilities without considering the significant Bosnian environmental factors (terrain, weather, nature of the enemy, and ROE).

The Bosnian environment is vastly different from the Iraqi environment. While the Iraqi environment is conducive to the employment of airpower, the Bosnian environment (terrain, weather, nature of the enemy, and ROE) all work against airpower. The Bosnian terrain is extremely mountainous and heavily forested. It provides ground forces with plenty of protection from airpower and sophisticated intelligence platforms. Moreover, the weather usually consists of low cloud ceilings and fog which limits visibility, prevents airpower from visually acquiring ground forces, and degrades the laser target designator when attempting to employ PGMs. The Bosnian Serb military is a largely guerrilla force

that effectively employs guerrilla tactics.¹⁷ Seldom do they mass their forces (present a viable airpower target) or leave their heavy forces without adequate concealment. In other words, the Bosnian Serb forces use their favorable environment to counter the US airpower advantage, unlike the Iraqi forces who play into the US airpower strength. Finally, restrictive ROE routinely prevents airpower from engaging Bosnian Serb forces due to poor weather, reduced visibility, Bosnian Serb forces close proximity to friendly/non-combatants, and the overriding desire to limit collateral damage.¹⁸ Bottom line, the Bosnian environment works against the effective employment of airpower and the Air Occupation survey will quantify its impact.

The initial US plan was to lift the arms embargo against Bosnian Muslims and coerce the Serbs to conform to UN demands through the use of airpower. Military planners felt they could destroy the Bosnian Serb Army as an organized entity with airpower quickly, but there was no guarantee that individual Serbian units would not continue to fight on as well armed guerrillas.¹⁹ These Serbian guerrilla forces would still be capable of inflicting heavy casualties on foreign troops. Moreover, the Bosnian Serbs are essentially light-infantry guerrillas and are an extremely challenging target for modern airpower. Airpower is more effective when it is employed against massed forces (Army size battalions), but has historically proven ineffective against guerrilla forces that are difficult to identify and target, especially in the Bosnian mountainous environment.²⁰

Recent events highlight the problems encountered in attempting to apply airpower in the Bosnian AOR. Coalition airpower has been unable to protect the UN designated safe area around the city of Gorazde in Bosnia.²¹ Serb forces moved heavy weapons and artillery in position to fire directly into the city of Gorazde, in clear violation of UN

resolutions declaring Gorazde a UN safe area. In response, the UN called for Close Air Support (CAS) to destroy the Serb heavy weapons and artillery. However, poor weather and the lack of a laser target designator prevented the employment of PGMs and French Mirage aircraft, US F/A-18 and F-16 aircraft were unable to locate the target due to poor weather. The US F-16 aircraft attacked their alternate target, a Serb artillery headquarters, which immediately stopped the artillery firing in Gorazde, but Serb forces quickly resumed their firing at a heavier rate after the fighters left the area.²² In response to the renewed shelling, US F/A-18's struck four ground vehicles, but poor weather and low clouds severely hampered the use of airpower.²³ In short, the environment significantly affected the UN's ability to employ airpower in Bosnia.

US intelligence collection platforms have been less effective in the Bosnian AOR compared to the Iraqi AOR. The problem is two fold. First, the mountainous and heavily forested Bosnian environment presents an extremely difficult problem for US intelligence collection platforms. In fact, JSTARS has been forced to move its orbit from over the Adriatic sea to over Hungary since the mountains in Bosnia run primarily north-south and the blind zones created when flying over the Adriatic sea (due to line of sight) were unacceptable and severely degraded JSTARS capability.²⁴ JSTARS operating over Hungary solves some of the problems, but still does not offer the optimum performance obtained in the Iraqi AOR. Second, the Bosnian Serb army is a lightly armed guerrilla force that is employing guerrilla tactics. They are smart enough to avoid playing into the US airpower strength and pose an extremely challenging problem for US intelligence collection platforms to locate and track. The Bosnian Serb army rarely masses its forces and always uses the environment to conceal its forces. Bottom line, our intelligence

system was designed to find conventional forces and if we cannot locate small guerrilla forces, we cannot engage them effectively with airpower.

While Bosnia presents a difficult problem for airpower, there have been some significant successes. Deliberate Force was a NATO air operation that convinced the Bosnian Serbs to sit down at the peace table.²⁵ The end result was the Dayton peace accords. Deliberate Force convinced the Bosnian Serbs to negotiate and lifted the siege of Sarajevo. Despite the overall success, the Bosnian environment presented difficult problems. ROE during Deliberate Force mandated that NATO pilots could not drop ordnance unless they could visually acquire the target due to concerns about friendly casualties and collateral damage.²⁶ A significant number of pilots returned home with their bomb loads intact due to weather. Major Johnson and Major Beletic, F-15E and F-16 pilots respectively who flew in Deliberate Force, both stated ROE and weather hindered their ability to effectively employ airpower in Bosnia.²⁷ The ROE in Bosnia was much stricter than the ROE over Iraq and significantly affected the success of airpower in Bosnia. In fact, Major Johnson described ROE as more significant than weather in hindering his ability to complete his missions in Bosnia.²⁸ ROE and weather will be analyzed in the Air Occupation Survey to determine if they equally impacted air operations in both the Bosnian and Iraqi AORs.

Despite all the recent success of airpower, it does have limitations and cannot achieve the same results in all environments. The Air Occupation survey will provide quantifiable data to support or disprove this premise. In Bosnia, all three of military analyst David Hackworth's governing factors (nature of the enemy, terrain, and weather) work against airpower. All three will be examined extensively in the Air Occupation

survey. Bosnia's terrain is heavily forested and extremely mountainous. Moreover, the weather usually consists of low cloud ceilings and fog obscures the valley floors from the air. The US experienced similar conditions in Vietnam which made airpower less effective.²⁹

Deliberate Force coerced the Serbs to the negotiating table, but the environment severely affected the efficient employment of airpower. The end result was the decision to employ a large NATO ground force (IFOR) in conjunction with airpower to achieve the desired operational and strategic objectives. Bosnia's current situation reflects a more old fashioned occupation compared to Iraq which uses a pure Air Occupation concept. Perhaps the environment is the difference and the Air Occupation survey will provide us the answer.

Airpower has been less effective in Bosnia than Iraq due to the difficult environment. Serbian guerrilla forces fighting in favorable terrain pose the most difficult test for airpower. Further study of the environment's impact on the employment of airpower in the Air Occupation role is warranted.

Notes

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² Philip A. Towle, *Pilots and Rebels*, (United Kingdom: Brassey's, 1989), 9.

³ Ibid., 19-20.

⁴ Wing Commander Michael B. M. Canavan, RAF, The Royal Air Force and Air Control to 1939, paper (Montgomery AL: University of Alabama, 1993), 15.

⁵ Lt Col David J. Dean USAF, Airpower in Small Wars: The British Air Control Experience, CADRE PAPERS (Maxwell AFB AL: Air University Press, April 1985), 10.

⁶ Canavan, 16.

⁷ Ibid., 16.

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⁸ Ibid., 16.

⁹ Philip A. Towle, *Pilots and Rebels*, (United Kingdom: Brassey's, 1989), 19-20.

¹⁰ Canavan, 34.

¹¹ U.S. Department of Defense, Office of International Security Affairs, *United States Security Strategy for the Middle East*. (Washington: U.S. Government Printing Office, 1995), 30.

¹² "Fact Sheet, Operation PROVIDE COMFORT" (Incirlick AB, TU: Combined Task Force Combined Information Bureau, 1995), 3.

¹³ US Central Command, *1993 Posture Statement*, (Washington: US Government Printing Office, 1995), 56.

¹⁴ General Ronald R. Fogleman, "Airpower and the American Way of War," presented at the Air Force Association Symposium, Orlando, FL, 15 February, 1996. Speech distributed as "Air Force Update 96-04," March 1996, by the Air Force News Agency, Kelly AFB, TX, p. 4.

¹⁵ General Merrill A. McPeak, "Flexibility and Airpower," *The Officer* v69 n12 (December 1993): 15.

¹⁶ J. McAllister, "To Bomb or Not to Bomb," *Time* v141 n19 (10 May 1993): 49.

¹⁷ Craig Covault, "AWACS, Command Chain Key to NATO Shootdown," *Aviation Week & Space Technology*, v140 n10 (March 7, 1994): 25.

¹⁸ Brent Johnson, Major USAF. F-15E pilot who flew in Operation DELIBERATE FORCE. Interview conducted by author on 15 January 1997.

¹⁹ Craig Covault, "AWACS, Command Chain Key to NATO Shootdown," *Aviation Week & Space Technology*, v140 n10 (March 7, 1994): 25.

²⁰ Ibid.

²¹ David Fulghum, "U.S. Crews Strike Serb Positions," *Aviation week & Space Technology*, v140 n15 (April 18, 1994): 60.

²² Ibid.

²³ Ibid.

²⁴ "Joint Surveillance Target Attack Radar System," *Jane's Defense Weekly*, v25 n03 (January 17, 1996): 26.

²⁵ Arthur Brill, "Anatomy of an Air Strike: The Road to Bosnia Starts in Beaufort," *Sea Power*, v39 n4 (April 1996): 82.

²⁶ Ibid., 85.

²⁷ Brent Johnson, Major USAF. F-15E pilot who flew in Operation DELIBERATE FORCE. Interview conducted by author on 15 January 1997.

²⁸ Ibid.

²⁹ David Hackworth, "Air Power Just Won't Work," *Aviation & Space Technology*, v121 n20 (May 17, 1993): 32.

Chapter 3

Air Occupation Survey Method

Subjects

The subjects for this study consisted of a group of fighter pilots chosen from the US Tactical Air Forces. Two groups were selected. The first group consisted of fighter pilots who have flown Air Occupation missions over Iraq and the second group consisted of fighter pilots who have flown similar missions over Bosnia. Five pilots flew in both AOR's and were used in both groups. Each group consisted of 20 randomly selected fighter pilots. Matching was used to ensure the experience level of both groups was consistent. All fighter pilots were Mission Ready (MR), 1,000 hours minimum in their assigned aircraft, 20 Air Occupation missions minimum in theater, and capable of wartime tasking.

Instrument

The instrument was a writer-designed questionnaire. The questionnaire was designed to determine the fighter pilots' perceptions of their overall mission performance, impact of ROE, weather, and terrain while conducting Air Occupation missions over Iraq or Bosnia. Additionally, the questionnaire was administered to a test group of fighter pilots to verify content, quality and possible vagueness of the survey instrument.

Procedures

Fighter pilots were matched by flight experience in their primary aircraft. When both groups had twenty matched fighter pilots the process stopped. Extra fighter pilots, or ones without a match, were not used.

The two test scores were analyzed using inferential statistics, a T test for matched samples, with an alpha = .05. If it is determined that there is a significant measurable difference in perceived overall mission performance between the groups, the hypothesis will be supported.

The results of this experiment are presented in the *Results*, *Conclusions*, and *Recommendations* sections of the research paper.

Limitations

The obvious limitation is the study examined the application of Air Occupation theory from the operators', fighter pilots', point of view. This study did not address the significance of political restrictions, (overflight restrictions, host nation basing rights), with the exception of ROE, and factors beyond the operators' control.

In some cases the Air Occupation missions were flown, but ordnance was not actually dropped. These missions are considered combat missions, but because the enemy is not defending their targets, pilots may be more aggressive and skew the results. One must be careful when drawing conclusions from simulated "combat missions," ordnance not dropped, and applying them to actual "combat missions," where the enemy would defend their targets with real bullets and missiles.

More research on airpower's overall performance in an Air Occupation role should be accomplished using larger sample sizes. Obviously, these studies will require considerable funding and emphasis from the highest levels within the US Air Force.

Chapter 4

Results

The following is an analysis of fighter pilot responses to the Air Occupation questionnaire in Appendix A. The questionnaire is a Likert scale format with a sample size of (N=40).

Weather significantly impacted fighter pilots' ability to conduct Air Occupation missions in Bosnia (Gorazde, Deliberate Force) compared to Iraq. 100% of all fighter pilots flying Air Occupation missions in Bosnia stated weather adversely affected their ability to locate ground targets and employ PGMs compared to 53% of fighter pilots who flew similar missions in Iraq.¹ More importantly, 83% of the fighter pilots who flew in Bosnia felt weather adversely affected their ability to accomplish the overall mission compared to 37% for fighter pilots flying in Iraq.²

Sixty-seven percent of fighter pilots flying in Bosnia feel there is an adverse relationship between the terrain and their ability to locate the ground target and employ PGMs compared to 16% of fighter pilots flying similar missions in Iraq.³ Moreover, 50% of the pilots flying in Bosnia feel a negative correlation exists between terrain and their ability to accomplish the overall mission in Bosnia compared to only 5% for fighter pilots flying in Iraq.⁴

Fighter pilots flying Air Occupation missions in Bosnia felt (33%) that ROE (visually acquiring target) adversely affected their ability to accomplish the mission compared to 26% for pilots flying in Iraq.⁵ There is no statistically significant difference between these percentages. However, 50% of pilots flying in Bosnia felt ROE adversely affected their ability to employ PGMs compared to only 16% of pilots flying in Iraq.⁶

Considering weather, terrain, desire to limit collateral damage, employment of PGMs, and ROE; pilots were asked to assess whether they could accomplish the mission of Air Occupation (defined as the ability of airpower to seize, deny, and control territory by deterring an adversary's activities on the ground). Sixty-seven percent of pilots flying in Bosnia felt they could accomplish the mission with significant success compared to 80% of pilots flying similar missions in Iraq.⁷

Intelligence contributions to overall success were evaluated and 33% of the pilots flying in Bosnia felt intelligence was accurate and significantly contributed to overall mission success compared to 47% for pilots flying in Iraq.⁸ Table 1 shows the percentage of pilots who feel each platform (JSTARS, AWACS, Rivet Joint) significantly increased overall mission success through real-time intelligence updates and is further broken down by theater of operation (Bosnia, Iraq).⁹

Table 1. Percent Increased Overall Mission Success

	Iraq	Bosnia
JSTARS	32%	0%
AWACS	58%	33%
Rivet Joint	32%	33%

Questionnaires were evaluated and analyzed using the T test for matched samples (alpha = .05), the appropriate test of significance.¹⁰ Results showed the means for the two

groups differed significantly (see Table 2).¹¹ Therefore, the original hypothesis that the environment has a significant measurable impact on overall element performance was supported.

Table 2. Means, Standard deviation, and T Test Scores

	Iraq	Bosnia
Mean	55.45	43.4
Standard Deviation	7.62	4.72

Note: Max Score = 80, Alpha = .05, df = 38, T(Crit) = 2.038, T Test Score = 5.86.

Notes

¹ Michael E. Tallent, "Air Occupation Survey," January 1997.

² Ibid.

³ Ibid.

⁴ Ibid.

⁵ Ibid.

⁶ Ibid.

⁷ Ibid.

⁸ Ibid.

⁹ Ibid.

¹⁰ L.R. Gay, *Educational Research: Competencies for Analysis and Application*, (Columbus OH: Merrill Publishing Company, 1987), 399.

¹¹ Tallent.

Chapter 5

Conclusions

Air Occupation is currently employed in Iraq and Bosnia. The results have been mixed, but the UN has been able to coerce the Iraqis, Serbian government, and Bosnian Serbs to ultimately conform to UN desires. In other words, Air Occupation has been validated and achieved operational and strategic objectives in Iraq and Bosnia.

The results of this study support the research hypothesis that the environment has a significant measurable impact on the mission success of Air Occupation missions. Simply put, the nature of the enemy, ROE, weather, and terrain have a significant measurable impact of the successful application of Air Occupation. The Bosnia environment works against high performance aircraft conducting Air Occupation missions and the Bosnian Serbs use guerrilla tactics requiring limited resupply, have little infrastructure inside Bosnia, and can hide effectively in the mountainous terrain. Conversely, Iraq is an industrialized country with a large conventional Army, relies on numerous modern oil refineries, sophisticated transportation and communication facilities, and is located in a barren desert which provides no protection from airpower. The difference between Bosnia and Iraq is enormous, making airpower significantly less effective in Bosnia compared to Iraq.

Accurate intelligence and the capability to obtain real-time intelligence updates is the weakest link in the Air Occupation equation. Accurate intelligence is vital to the Air Occupation concept and without it can lead to a total collapse of the operational concept. PGMs capable of limiting collateral damage are of no use if the pilot strikes the wrong target or does not receive a real-time intelligence update that the target has moved since the preflight brief. The increased precision of PGMs has placed an increased demand on the intelligence community to not only locate the target, but to locate the room and floor which needs to be destroyed. Moreover, mobile targets require real-time updates in order for the direct action platform to locate and destroy them. Bottom line, the environment affects intelligence collection and Air Occupation effectiveness is significantly degraded because intelligence and real-time updates are insufficiently accurate and timely.

The US intelligence infrastructure was developed to counter the Soviet threat in western Europe. Satellites and other intelligence platforms were designed to locate large conventional armies emitting sophisticated electronic, communication, and radar signals. Our intelligence community has relied on our technologically advanced systems to locate and track these Soviet Armies and has lost some of the ability to conduct human intelligence (HUMINT). The US's over reliance on these systems has made us vulnerable to a low technology threat. In other words, guerrilla forces (nature of the enemy) using personnel to transport supplies present a significant problem for our intelligence community.

ROE can limit the ability to successfully conduct Air Occupation missions. The problem arises from the desire to limit collateral damage versus the ability to employ PGMs. During Deliberate Force, many combat missions were ineffective due to the ROE

restriction requiring pilots to visually acquire the target before engaging. The ROE severely reduced the pilots' ability to accomplish their missions in adverse weather. Currently, many direct action platforms have the capability to strike targets with precision in an adverse weather environment. However, the desire to ensure collateral damage is minimized has taken precedence and limited the ability to successfully employ direct action weapons in an Air Occupation role.

Recommendations

Intelligence is the critical weak link in the Air Occupation equation. Air Occupation requires vast quantities of information from various sensors to be fused, analyzed, and distributed in near real-time to a direct action platform that can identify and destroy targets with PGMs. This is not an easy task, and operators flying Air Occupation missions indicate that we are currently doing a poor job in this area. Advances in information processing, intelligence dissemination, and communications bandwidth capability will help to solve this difficult problem. US direct action platforms must have the ability to data link directly from other sensor platforms. This capability allows the operator to increase his overall situational awareness, avoid hostile threats, reduce fratricide, and locate his targets by transmitting and receiving critical real-time information through the data link system. Intelligence sensors must be developed that can operate in and through adverse weather, mountainous terrain, heavily forested terrain, and line of sight limitations of current platforms must be overcome so that intelligence platforms can operate effectively and out of harm's way. Finally, intelligence sensors must be developed that can locate small guerrilla units, determine their intent, and relay

this information in near real-time to direct action platforms. Bottom line, technology must improve to replace the unique capability of HUMINT.

The British RAF accomplished “Air Control” by relying on outstanding intelligence from their Colonial Administrators (HUMINT) which provided signs of impending trouble and predicted intent. Moreover, the RAF did not possess a sophisticated communication system and allowed operational decisions to be made at the lowest practical level by people who were intimately familiar with the situation allowing the RAF to react quickly. Today, the US has abandoned HUMINT and become dependent on technology. Hence, the US must develop real-time distribution systems between the sensors, commanders, and direct action platforms to fill the void HUMINT once filled.

Political leaders and military planners must realize the tradeoff between limiting collateral damage and the delivery of PGMs when developing ROE. Direct action platforms can deliver PGMs in many adverse environments, but military planners’ desire to limit collateral damage has limited our ability to successfully accomplish Air Occupation missions. Direct action platforms must be allowed to engage targets even if they cannot visually acquire the target. Radar map, and IR systems currently allow many direct action platforms to engage targets with extreme precision through adverse weather. The military planner must weigh the balance between the desire to minimize collateral damage and the desire to successfully employ PGMs in adverse environments. ROE restrictions are critical to the successful employment of airpower.

Military planners must realize the limitations of airpower when recommending courses of action. The environment and nature of the enemy can significantly affect the success of airpower. The success of airpower in Iraq is not universally applicable to all

environments and Iraq's conventional army located in the barren desert is far different than a small guerrilla force fighting in favorable terrain. Moreover, our intelligence network was designed to locate the Soviet threat, a large sophisticated conventional force, not a low technology guerrilla force. Military planners must be extremely cautious and not get caught up with over enthusiastic airpower advocates who are espousing inflated lessons learned following the Persian Gulf War. Seventy years of over promising by airpower advocates from the 1920s on has seriously damaged Air Force credibility. The Persian Gulf War validated many operational concepts advocated years earlier and restored Air Force credibility. Realistic airpower advice by military planners will help to maintain Air Force credibility and save us the embarrassment of over promising once again.

Questionnaire

Background Data:	Name:	Seminar #
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Missions flown in Operation DENY FLIGHT _____ (Bosnia)

3. Employment of Precision-Guided Munitions (PGMs) was adversely affected by weather.

1 2 3 4 5

4. Employment of Precision-Guided Munitions (PGMs) was adversely affected by terrain.

1 2 3 4 5

5. Rules of Engagement (ROE) adversely affected employment of PGMs.

1 2 3 4 5

6. Overall mission success was adversely affected by weather.

1 2 3 4 5

7. Overall mission success was adversely affected by terrain.

1 2 3 4 5

8. Overall mission success was adversely affected by ROE.

1 2 3 4 5

9. Weather adversely affected the ability to limit Collateral damage.

1 2 3 4 5

10. Terrain adversely affected the ability to limit Collateral damage.

1 2 3 4 5

11. ROE adversely affected the ability to limit Collateral damage.

1 2 3 4 5

12. Intelligence was accurate and significantly increased overall mission success.

1 2 3 4 5

13. Real-time intelligence updates (JSTARS) significantly increased overall mission success.

1 2 3 4 5

14. Real-time intelligence updates (AWACS) significantly increased overall mission success.

1 2 3 4 5

15. Real-time intelligence updates (Rivet Joint) significantly increased overall mission success.

1 2 3 4 5

16. Air Control (The Use of Airpower to seize, deny, and control territory by deterring an adversary's actions on the ground) was employed with significant success. (I was able to identify the target, employ PGMs, and limit collateral damage given the mission, weather, terrain, and ROE).

1 2 3 4 5

Iraq Air Occupation Survey

Background Data: _____ **Name:** _____ **Seminar #** _____

Aircraft Flown _____ Hours _____
_____ Hours _____
_____ Hours _____

Missions flown in Operation SOUTHERN WATCH _____ (Southern Iraq)

Missions flown in Operation PROVIDE COMFORT _____ (Northern Iraq)

Missions flown in Operation DENY FLIGHT _____ (Bosnia)

Air Occupation: The Use of Airpower to seize, deny, and control territory by deterring an adversaries actions on the ground.

Please circle the number which most correctly describes your experience during air combat missions over **Iraq**.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1	2	3	4	5

1. Target identification of fixed targets (airfield, bridge, road intx) was adversely affected by poor weather.

1 2 3 4 5

2. Target identification of fixed targets (airfield, bridge, road intx) was adversely affected by terrain.

1 2 3 4 5

3. Employment of Precision-Guided Munitions (PGMs) was adversely affected by weather.

1 2 3 4 5

4. Employment of Precision-Guided Munitions (PGMs) was adversely affected by terrain.

1 2 3 4 5

5. Rules of Engagement (ROE) adversely affected employment of PGMs.

1 2 3 4 5

6. Overall mission success was adversely affected by weather.

1 2 3 4 5

7. Overall mission success was adversely affected by terrain.

1 2 3 4 5

8. Overall mission success was adversely affected by ROE.

1 2 3 4 5

9. Weather adversely affected the ability to limit Collateral damage.

1 2 3 4 5

10. Terrain adversely affected the ability to limit Collateral damage.

1 2 3 4 5

11. ROE adversely affected the ability to limit Collateral damage.

1 2 3 4 5

12. Intelligence was accurate and significantly increased overall mission success.

1 2 3 4 5

13. Real-time intelligence updates (JSTARS) significantly increased overall mission success.

1 2 3 4 5

14. Real-time intelligence updates (AWACS) significantly increased overall mission success.

1 2 3 4 5

15. Real-time intelligence updates (Rivet Joint) significantly increased overall mission success.

1 2 3 4 5

16. Air Control (The Use of Airpower to seize, deny, and control territory by deterring an adversary's actions on the ground) was employed with significant success. (I was able to

identify the target, employ PGMs, and limit collateral damage given the mission, weather, terrain, and ROE).

1

2

3

4

5

Appendix B

T Test for Independent Samples

\bar{X}_1 = mean of group #1: N_1 = sample size of group #1

\bar{X}_2 = mean of group #2: N_2 = sample size of group #2

d_1 = actual number - \bar{X}_1

d_2 = actual number - \bar{X}_2

S_1 = standard deviation of group #1 = $\frac{\sqrt{\sum d_1^2}}{\sqrt{N_1}}$

S_2 = standard deviation of group #2 = $\frac{\sqrt{\sum d_2^2}}{\sqrt{N_2}}$

S_{x1} = standard error of the mean of group #1 = $\frac{S_1}{\sqrt{N_1 - 1}}$

S_{x2} = standard error of the mean of group #2 = $\frac{S_2}{\sqrt{N_2 - 1}}$

$T = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{S_{x1}^2 + S_{x2}^2}}$

$df = N_1 + N_2 - 2$

$\alpha = 1 - \text{confidence level}$

$\alpha = .05 = 95\%$ probability that hypothesis is supported

Appendix C

Raw Data

Table 3. Iraq Air Occupation Survey Total Scores

50	55	50	50	59
50	66	51	47	67
39	60	65	59	56
47	63	66	54	55

20 data points, where SA = 1 . . . SD = 5. Sum of survey question responses for each participant.

Table 4. Iraq % Response to Air Occupation Survey

<i>Question</i>	<i>SA (1)</i>	<i>A (2)</i>	<i>U (3)</i>	<i>D (4)</i>	<i>SD (5)</i>
1	10	42.5	0	20	27.5
2	5	7.5	0	7.5	80
3	2.5	40	0	20	37.5
4	5	10	5	20	60
5	0	15	10	15	60
6	10	27.5	5	20	37.5
7	0	5	5	20	70
8	5	20	5	15	55
9	5	0	20	15	60
10	0	0	5	5	90
11	5	0	12.5	20	62.5
12	30	17.5	15	20	17.5
13	22.5	10	52.5	10	5
14	25	32.5	22.5	10	10
15	17.5	15	47.5	10	10
16	60	20	5	10	5

Breaks out % of responses in each area SA–SD.

Table 5. Bosnia Air Occupation Survey Total Scores

46	44	44	46	30
41	42	42	43	43
41	41	45	45	40
41	41	49	52	52

20 data points, where SA = 1 . . . SD = 5. Sum of survey question responses for each participant.

Table 6. Bosnia % Response to Air Occupation Survey

<i>Question</i>	<i>SA (1)</i>	<i>A (2)</i>	<i>U (3)</i>	<i>D (4)</i>	<i>SD (5)</i>
1	80	20	0	0	0
2	37.5	30	15	12.5	5
3	90	10	0	0	0
4	40	27.5	0	20	12.5
5	45	5	0	40	10
6	80	5	15	0	0
7	20	30	0	40	10
8	30	2.5	35	25	7.5
9	40	10	32.5	10	7.5
10	35	15	32.5	5	12.5
11	40	10	0	35	15
12	32.5	0	50	10	7.7
13	0	0	50	25	25
14	30	2.5	15	20	32.5
15	25	7.5	50	10	7.5
16	30	37.5	15	15	2.5

Breaks out % of responses in each area SA–SD.

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